## REMARKS

This Amendment responds to the Office Action dated April 26, 2004 in which the Examiner stated that claims 28-31 and 36-45 are allowed and rejected claims 32-35 under 35 U.S.C. § 103.

As indicated above, claim 32 has been amended to make explicit what is implicit in the claim. The amendment is unrelated to a statutory requirement for patentability.

Claim 32 claims a method of transferring an electrical digital signal from a first terminal on an optical fiber to a second terminal. The electrical digital signal is incoming to the first terminal. The method comprises the sequential steps of: modulating a first one of a control digital signal, the control digital signal comprising control information used for controlling the electrical digital signal, and the electrical digital signal on a radio frequency subcarrier to provide a first modulated signal having the frequency of the radio frequency subcarrier; modulating a second one of the control digital signal and the electrical digital signal, the second one being different from the first one, using a spread-spectrum method on a different one of radio frequency subcarriers to provide a second modulated signal having the frequency of the different one of radio frequency subcarriers; adding the first and second modulated signals to provide a sum signal; converting the sum signal to an optical signal; transmitting the optical signal on the optical fiber to the second terminal to be received in the second terminal as a received optical signal; and performing, in the second terminal, inverse operations on the received optical signal to provide signals corresponding to the electrical digital signal and to the control digital signal.

Through the method of the claimed invention modulating one of a control digital signal and an electrical digital signal on a radio frequency subcarrier to provide a first modulated signal having the frequency of the radio frequency subcarrier and then modulating the second one of the control digital signal and the electrical digital signal using a spread-spectrum method on a different one of the radio frequency subcarriers to provide a second modulated signal having the frequency of the different one of the radio frequency subcarriers, as claimed in claim 32, the claimed invention provides a method of transferring an electrical digital signal which can be easily separated by filtering. The prior art does not show, teach or suggest the invention as claimed in claim 32.

Claims 32-35 were rejected under 35 U.S.C. § 103 as being unpatentable over *Rakib et al.* (U.S. Patent No. 5,966,376) in view of *Adachi et al.* (U.S. Patent No. 5,734,648).

*Rakib et al.* appears to disclose a field of bidirectional communication of digital data over coaxial cable or other transmission media. (col. 1, lines 12-14) Referring to FIG. 1, there is shown a conceptual diagram of a system for multiple access digital communication over a cable TV coaxial conductor distribution system using orthogonal codes for CDMA. The system of FIG. 1 depicts only the circuitry to transmit data from multiple subscribers to a head end receiver. (col. 6, lines 55-60) To utilize these mathematical relationships of FIGS. 2 and 3A and convert them into a practical digital data communication system, symbolized by the system of FIG. 1, subscriber #1 provides a digital input stream of symbols or bits using any input device or computer (not shown). This digital data stream to be transmitted to the head end arrives on bus 10 at the data input of a code #1 modulator/transmitter 12.

(col. 7, lines 31-37) In the embodiment shown in FIG. 3A, modulator/transmitter 12 converts the digital data in the data stream arriving on bus 10 into amplitude modulations of a carrier signal using a first orthogonal code, and outputs the modulated carrier signal on feeder link coaxial conductor 18 coupled to an input of a summer 20. (col. 7, lines 55-60) Likewise, subscriber #2 provides a digital data input stream on bus 14 to a code #2 modulator/transmitter 16. This digital data stream on bus 14 will be divided into individual symbols or bits to be transmitted. The first bit from the stream on bus 10 will become the second vector element in the information vector [b]. Modulator/transmitter 16 converts the digital data in the data stream arriving on bus 14 into amplitude modulations of a carrier signal by partial matrix multiplication similar to that done by modulator/transmitter 12 using a second code, i.e., another column of the code matrix [c] which is orthogonal to said first code. Modulator/transmitter 16 then outputs the modulated carrier onto a feeder link coaxial cable 22 coupled to another input of summer 20. That is, the modulator/transmitter 16 performs the multiplication of the second element of information vector [b] times the appropriate element of the second column of code matrix [c], i.e., code #2. The effect of the multiplications by the modulator/transmitters 12 and 16 is to spread the energy of each bit or symbol to be transmitted out over time by multiplication of each bit in the information vector by the multiple code elements in the appropriate column of the code matrix [c]. (col. 8, lines 10-32) The modulator/transmitter 16 will modulate the carrier to an amplitude or frequency representing the level $2/\sqrt{2}$ of the second element of the result vector R during a second time and drives the carrier so modulated onto coaxial link 22 as the combined signal carrying the data from both channels #1 and #2 simultaneously

across the shared transmission media 24. The multiplication [b]×[c] is carried out by the two code modulator/transmitters 12 and 16, each doing a part of the multiplication. Modulator 12 multiplies the first element of the information vector [b] from subscriber #1 times the elements in the first row of the code matrix and outputs the resulting partial products during two successive intervals on line 18 coupled to the input of the summer 20. Likewise, the code #2 modulator 16 multiplies the second element of the information vector [b] from subscriber #2 times the two elements in the second row of the code matrix [c] and outputs the resulting two partial products on line 22 to the summer 20 during the same two successive intervals used by modulator 12. The signals output by the modulator/transmitters 12 and 16 during the first of the two successive intervals are summed by summer 20 and output on coaxial cable 24 as the first component, 0, of the result vector R=[0,2/√2]. The signals output by the modulator/transmitters 12 and 16 during the second of the two successive intervals are summed by summer 20 and output on coaxial cable 24 as the second component, 2/√2, of the result vector [0,2/√2]. Shared transmission media 24 can be any metallic or fiber optic media, terrestial microwave link or satellite/cellular link. To recover the original information vector [b], on the receiver side of the transaction, the receivers multiply the received signals times the transpose code matrix [$c^T$] in a manner to reverse the encoding process. (col. 9, line 28 through col. 10, line 2) Returning to the discussion of FIG. 1, coaxial cable 24 is coupled to a head end receiver 26. At the head end receiver, the signal on cable 24 is split onto separate coaxial cable links 28 and 30, each of which is coupled to a receiver of which receivers 32 and 38 are typical. The function of the receivers is to demodulate the received signals to derive the elements of the result

vector which were used as modulation factors, and to multiply these result vector elements times the columns of the transpose matrix $[c^T]$ to recover the information vector [b] originally transmitted. To accomplish this function, link 28 is coupled to the analog input of a receiver 32 which is comprised of a multiplier 34 and an integrator 36. (col. 10, lines 31-44)

Thus, *Rakib et al.* merely disclosed bidirectional communication of digital data. Nothing in *Rakib et al.* shows, teaches or suggests modulating a control digital signal and an electrical digital signal on a radio frequency subcarrier and modulating a second one of a control digital signal and an electrical digital signal using a spread-spectrum method on a different radio frequency carrier as claimed in claim 32. Rather, *Rakib et al.* merely discloses bidirectional communication of digital data over a coaxial cable.

*Adachi et al.* appears to disclose a CDMA communications method and system which can implement variable rate data transmission from a high-rate to low-rate with a small amount of increase in circuitry of transceivers. (col. 2, lines 57-60) FIG. 5 shows a major portion of a base station which employs the first method. In this embodiment, the transmission rate of data inputted to channel input terminals $111_1$ -$111_n$ is 1/N of the fundamental transmission rate, where N is a positive integer. In other words, the data have a temporal length N times longer than the same amount of data of the fundamental transmission rate. The data are supplied to TCH frame thin-out circuits $112_1$ -$112_n$, and are time-compressed by a factor of N (N=4 in FIGS. 6A-6C) at every time period T to form packets, where T is the length of a frame of the fundamental transmission rate. These packets undergo the primary modulation in primary modulators $113_1$-$113_n$, and then the spectrum-spreading

modulation in secondary modulators (spreading modulators) $114_1$-$114_n$, thereby being converted into wideband signals. The spreading modulators $114_1$-$114_n$ receive different spreading codes $C_1$-$C_n$ from spreading code generators $115_1$-$115_n$. In this case, the packets $P_1$-$P_n$ generated by the TCH frame thin-out circuits $112_1$-$112_n$ have random time relationships with each other, as shown in FIGS. 6A-6C. This is allowable because the plurality of packets are each associated with different spreading codes, and hence, the packets can be separated at the receiving side even if they overlap with each other temporally. Accordingly, as soon as individual channel signals are inputted, they can be formed into packets without any time adjustments. Base stations have, in addition to the traffic channels, common control channels for transmitting control information such as identification information of respective base stations and paging information. Furthermore, a weather forecast, and other broadcasting information can be transmitted as required. The information on the common channel is spread by spreading code $C_c$, different from the spreading codes $C_1$-$C_n$, for communications, and is transmitted from common control channel transmitting portion 116. The outputs of the spreading modulators $114_1$-$114_{n+1}$ are combined, supplied to an output terminal 117, and transmitted from a transmitter not shown in FIG. 5 as an electric wave. (col. 9, lines 8-45)

Thus, *Adachi et al.* merely discloses modulators which modulate an intermediate frequency and a carrier signal which can include a control signal. However, *Adachi et al.* does not show, teach or suggest what frequencies are used in the modulators and the chip rate of the spectrum spreading. Thus, nothing in *Adachi et al.* shows, teaches or suggests modulating a first one of a control digital signal and an electrical digital signal on a radio frequency subcarrier and modulating

a second one of the control digital signal and an electric digital signal using a spread-spectrum method on a different radio frequency subcarrier as claimed in claim 32. Rather, *Adachi et al.* is silent as to the frequencies used in the modulators and the chip rate of the spectrum spreading. Hence, *Adachi et al.* uses frequencies which are equal to each other, i.e., a single frequency.

Since nothing in *Rakib et al.* or *Adachi et al.* show, teach or suggest modulating a first one of a control digital signal and an electrical digital signal on a radio frequency subcarrier and modulating a second one of a control digital signal and an electrical digital signal using a spread-spectrum method on a different radio frequency subcarrier as claimed in claim 32, Applicants respectfully request the Examiner withdraws the rejection to claim 32 under 35 U.S.C. § 103.

Claims 33-35 depend from claim 32 and recite additional features. Applicants respectfully submit that claims 33-35 would not have been obvious within the meaning of 35 U.S.C. § 103 over *Rakib et al.* and *Adachi et al.* at least for the reasons as set forth above. Therefore, Applicants respectfully request the Examiner withdraws the rejection to claims 33-35 under 35 U.S.C. § 103.

Thus it now appears that the application is in condition for reconsideration and allowance. Reconsideration and allowance at an early date are respectfully requested.

If for any reason the Examiner feels that the application is not now in condition for allowance, the Examiner is requested to contact, by telephone, the Applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed within the currently set shortened statutory period, Applicants respectfully petition for an appropriate extension of time. The fees for such extension of time may be charged to our Deposit Account No. 02-4800.

In the event that any additional fees are due with this paper, please charge our Deposit Account No. 02-4800.

Respectfully submitted,

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